

Moving Towards an API Economy

By

Heather A. Smith
James D. McKeen

The IT Forum …

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Introduction

With the advent of mobile technologies, we have all realized how connected we are. But we don't often realize how this connectivity takes place or where it is leading us as individuals, organizations, or economies. With the addition of the Internet of Things (IoT), there will soon be literally billions of devices in our homes, businesses, and elsewhere all wanting to interact with each other and with a variety of software and generating zettabytes of data (Susain 2016).

This connectivity is increasingly being enabled by application programming interfaces (APIs). The basic idea of an API is that the owner of one application creates a set of access methods that can be called by another application. The API is documented and, if used correctly, creates a level of abstraction between the two applications. This means that changes can be made to either application without affecting the way they interact.

This is not a new concept in IT. Programmers have used something similar for several decades to standardize communication between a system's modules, thereby isolating chunks of functionality and reducing errors (Clark 2016). However, APIs have gained new attention in recent years because technology start-ups (unburdened by legacy systems) have used them achieve faster time-to-market and create new functionality by accessing data and chunks of functionality (e.g., Geolocation) *externally* as well as internally. As a result, larger organizations are now increasingly relying on external APIs to help them do the same (O'Neill 2016). But APIs are more than basic tools for application developers and data scientists. By enabling the rapid reuse and recombination of disparate data and functionality, they also facilitate the development of completely new products and services, and they allow companies to participate in ecosystems of organizations without the traditional need for extensive negotiation and customization of information systems. In addition, they are now enabling companies of all sizes to tap into specialized services – such as cognitive computing and IoT networks – that are too difficult, expensive or time-consuming to reproduce in-house (Narain et al. 2016).

These new capabilities enabled by APIs mean that APIs are now not just a technical element of IT, they have become a strategic business priority that will change the nature of organizations and business models as well (Collins and Sisk 2015; Narain et al. 2016). And as the commercial exchange of business functions and capabilities using APIs expands, it is predicted that an API economy will also evolve to utilize them more effectively. But today, understanding how and where to use APIs remains a challenge for both business and IT leaders and despite the hype, there still is much to learn about the effective utilization of APIs to deliver business value.

This paper explores how organizations are approaching the opportunities and challenges of using APIs. It begins by better defining what an API is, where it fits in with other IT work, and how APIs are expected to deliver value. Then it examines how use of APIs is anticipated to lead to economic transformation. Following this, it presents a framework for thinking about API usage in organizations and offers some practical advice for how leaders can get started with APIs.

What is an API?

APIs are multi-purpose tools that provide simple external interfaces for a variety of purposes (Clark 2016). The focus group explained that an API is an arm's length, shareable interface that acts as a common communication channel providing access to data and capabilities. "In the past, business logic and presentation were combined in a single system," said a manger. "Now, we keep channels separate from logic." An API is therefore a standardized software component acting independently of its host application and enabling bridges to be built between applications (whether inside or outside the organization) to bring together disparate functionality to create new forms of value (Malinverno 2016).

The term "API" is often used interchangeably with "SOA" and "microservices". Although some have attempted to distinguish between these, the fact is that "it is impossible to gain agreement on how they relate to each other" and that the tools are merging and combining in

our thinking (Clark 2016). One focus group manager noted that "microservices are a way of building fine-grain composable functionality and APIs are the interface to it. Microservices talk through APIs." Others simply state, "APIs expose assets like data, algorithms, and transactions [and] make it easier to integrate and connect people, places, systems, data, things, algorithms, to create new products/services and business models" (Collins and Sisk 2015).

It is more helpful to distinguish APIs based the functionality they enable:

- System APIs provide a means of communicating and interacting with legacy systems. For example, a company may need to call a balance transaction from legacy system to use in its mobile app. System APIs remove the need to know specific protocols and/or business logic unique to the underlying legacy systems.
- Business APIs are composable services that include logic, such as "customer lookup" or, "provide account summary" or, "present a consolidated view". They offer hybrids or combinations of services and could be internally or externally focused.
- Experience APIs shape services for a user interface (UI), such as for a mobile app. "These emphasize how we engage with customers," said a manager. "They're not about core business logic but about shaping data to a UI and speed of response.
- Algorithm APIs provide access to a particular piece of computational logic.

Until recently, APIs have been built on a one-off basis by individual project teams (Collins and Sisk 2015) and it has often been assumed that APIs are easy to consume by others (O'Neill 2016). The reality, however, is that APIs add new layers of complexity to IT services and companies are now looking for more formal ways to manage them. Organizations are also concerned about the risks involved of becoming more connected online in myriad ways (Longbottom 2015). Thus, there is a need for API management tools (Columbus 2017; Golluscio et al. 2017).

Three types of tools simplify the consumption and use of APIs:

1. API portal. A portal gives developers the ability to discover APIs and experiment with them (Clark 2016). If APIs are exposed to external developers, they also provide a means for developers to register to use APIs and pay them if they develop a useful product/service using organizational data/functionality. In addition it provides protocols and policies for allowable interactions.
2. API mediation. This manages the authorization and security between the calling and responding functions of APIs as well as managing audit and information transformations (Longbottom 2015; Malinverno et al. 2017). It supports all API interactions (i.e., between developer and external APIs and between IT systems and devices). API mediation also ensures security (including authentication, authorization and protection), traffic management, and orchestration so that APIs can be customized for different constituencies and usage monitoring (Golluscio et al. 2017).
3. API portfolio. Since APIs are not transient, they must be managed over their lifecycle (i.e., establishing a clear definition of value, a defined audience, and measurement of effectivenss) (Collins and Sisk 2015).

Because they enable an organization's core assets to be reused, shared, and monetized thus extending the reach of existing services and possibly creating new revenue streams, APIs are now considered a business model driver worthy of boardroom consideration (Collins and Sisk 2016). And by creating a platform for digital commerce, APIs are thus the foundation for every digital strategy (Malinverno et al. 2017). However, APIs and API management are still in their earliest stages and companies have much to learn about how to use them effectively and how to fit them into their broader business strategies (Columbus 2017).

The Value of APIs

An important factor in being successful with APIs is understanding their potential value and intentionally selecting how and where they should be used. Although there is a great deal of hype in business about using APIs to sell corporate data and generate more revenue, the

reality is that "few companies have mastered these capabilities and they take years to develop. Many companies *want* to do this but the problem is that it's very difficult to do" (Wixom 2016).

Much of the confusion about APIs stems from complexity about the different ways they can be used to deliver value. There are four primary ways that value can be derived from APIs:

- **APIs for Improvement.** Due to their enhanced ability to integrate applications, APIs can streamline development processes dramatically reducing an organization's time-to-market with new products (Columbus 2017). These advantages help organizations improve customer experience, comply faster with new regulations, and rapidly expose their products and services to the broadest possible audience (Collins and Sisk 2015).
- **APIs for leveraged products and services.** A second way of using APIs is can also to differentiate a product or service by enhancing it with data, new forms of presentation, or new functionality (Wixom 2016). This is done by providing access to some of an organization's APIs to carefully vetted external developers. These help companies offer an improved customer experience, add new digital products, and multiple or open new business channels to the market (Narain et al. 2016; Malinvero et al. 2017). They also enable the orchestration of a number of different APIs to facilitate new business processes while providing real-time integration. For example, software vendors now provide organizations with a number of common insurance functions through APIs such as, VIN lookup; address verification; and real-time verification of insurance. A key component of delivering value in this way is having a clear understanding of customer needs as these must be reflected in the APIs and the apps that are subsequently created (Columbus 2017).
- **APIs for inter-organizational innovation.** Organizations may also seek "frictionless" transactions with trusted partners to leverage each other's data and services in order to reduce costs and time (Narain et al. 2016). To do this, a company offers a subset of APIs to its business partners. The more business sensitive the API, the more tightly these partners, vetted, and managed (Malinverno 2016). The value in sharing APIs may come from selling

data, attracting new customers or retaining existing ones through competitive differentiation.

- **APIs for continuous platform innovation.** The most visionary form of API value derives from opening up company data and services to a much broader and more open ecosystem of developers and organizations to create radically new products, services and business models. Predictions are that APIs will be "the new conduits through which future innovation can and will be realized globally and drive the next level of differentiation" (Narain et al. 2016). In this scenario, a company creates a platform of APIs that supports the creation of an external ecosystem with connections to new marketplaces and communities. These APIs open new business channels, bring in more clients, maximize client retention, and enable the development of apps a company doesn't have either the time, ideas, or resources to develop (Malinverno et al. 2017). Here, APIs may be saleable products that generate revenue every time they are "called" (Clark 2015). An example of this type of API use is Salesforce, which uses APIs to jumpstart new solutions and offerings from other developers.

Each of these approaches to API value requires different capabilities and organizational commitments to strategy, design, and execution (Wixom 2016). To better understand these, leaders should ask the following questions about any API initiative:

- How is value created with this API?
- How is value measured?
- Who owns the value generation?
- Whose problem is solved?
- What are the key risks?

The API Economy

The API economy is a catchphrase suggesting that APIs are a rapidly expanding economic force (Longbottom 2015). It is characterized by a "marketplace driven by data that uses APIs to reach customers" (Narain et al. 2016). In this economy, APIs act as the digital conduit linking

services, applications, and systems. They enable organizations to share data and applications using easily accessible standards and platforms. These, in turn, allow businesses to make the most of their data to create compelling customer experiences and open new revenue channels. In short, the API economy is the commercial exchange of business functions and capabilities using APIs. It has captured the attention not only of software developers, but also of strategists and business leaders seeking to move to the next level of marketplace differentiation (Narain et al 2016).

What this means is that organizations won't act as lone entities anymore. In the API economy, companies will work together to create more value than either of them could independently (Anuff 2016). Moving forward, APIs will redefine the nature of partnerships allowing companies to collaborate without the traditional need for extensive negotiation and customization of systems (Narain et al. 2016). APIs are also the enablers that turn individual businesses into platforms (Pettey 2016). As one researcher states, "It's not enough for a business to serve its customers and make money, it has to be a platform and you can't be a platform without APIs" (Anuff 2016). And it's not an option. Focus group participants noted that APIs are being forced on them in a variety of ways. "Our regulators are now requiring us to provide APIs," said one member. Another stated, "In banking, if you want to participate in foreign exchange, you must use them." "APIs have already externally changed the game we're in," said a third.

In our present economy, products and services from a supplier are pushed to customers either directly or through intermediaries (Isckia and Lescop 2015). In the future, APIs will evolve from enabling simple connectedness, to supporting remote interactions across a network, to platforms where APIs facilitate and accelerate new service development, to ultimately becoming the actual product or service a company delivers (Collins and Sisk 2015). As such they will become the fuel that keeps companies competitive and drives a significant economic shift. In an API economy, the products are APIs and the market is global (Malinverno 2016).

The API economy can thus be viewed as a set of business models and channels that provide secure access to functionality and data (Malinverno 2016). These create a platform that attracts partners who will develop and market its products (Isckia and Lescop 2015). Together, all entities affiliated with a platform act as a business ecosystem that builds on the strengths of others, takes advantage of shared affiliations, and draws in new participants.

By connecting people, businesses and things into digital platforms through APIs, the API economy will be driven by a different economic logic. Platforms will serve as mediating entities that create value by facilitating interactions between agents that operate on different sides of a digital market (Hoelsch and Ballon 2015). And the pace of change will constantly accelerate through recombinations of resources and knowledge. Thus, a platform's success will depend not only on the platform's owner but also on its members' ability to innovate. When a platform has attained a critical mass of participants, entry barriers will high. Competition will be about who has the best platform strategy and the best ecosystem to back it up (Isckia and Lescop 2015). Differentiation will come from the APIs available and how motivated developers are to create applications using them (Malinverno et al. 2016).

A Framework for Thinking about APIs

Focus group companies were in the earliest stages of thinking about API strategy. "At present, we are driven by demand," said a manager. "If there's a market we want to participate in, we must use APIs." Others noted that much of their API use is motivated by internal productivity. "We've justified API use by reusability and simplicity," said a member. "Our business leaders believe that APIs mean reuse which means go fast." Another added, "Large companies also have internal customers and they have the same types of problems as our external customers. Sharing data internally can deliver real value. We're gaining tons internally."

They admitted they were struggling to articulate a comprehensive API strategy. "We need to figure out what data we're going to expose both internally and externally and how we are going to manage both levels," said a manager. "It's a struggle about where to focus because

of the different layers involved," added another. In addition to the strategic complexity involved, organizational leaders are debating the risks of using APIs in external marketplaces. "Our executives are scared of external exposure," stated a member.

There is broad recognition that companies must begin to think about external APIs and the focus group had numerous ideas on how to do this. Some want to create their own marketplaces that attract others to their platform. This model is particularly appealing to industries with a few large players and lots of peripheral development, as in banking, which has lots of small Fintech companies experimenting and innovating with particular banking functions. Others are looking at externally-sourced data to determine how they can incorporate it into their own apps and systems to make them richer and more contextual. And some are exploring how they might best monetize their own data for external consumption. Companies are also exploring partnering as an alternative to fully open markets. "We're using APIs primarily as a means of integrating with software-as-a-service," said a manger. Still others are focusing on making themselves easy to work with through APIs. "It's all about selling more stuff. Competition is easier if you are easy to integrate with," said a manager. One manager concluded, "We have no major external drivers. APIs feel more like a survival strategy to us."

Most large companies are approaching APIs cautiously while recognizing that APIs and their management must be tackled. If the four types of API value are configured according to whether they enable broad use of an organization's APIs or a more limited set, and whether they use a closed (or tightly managed) API market or an open one, an *evolutionary* framework emerges. This traces API use from limited, closed, internal approaches to more controlled external uses to more wide-open strategic uses (see Figure 1). Companies can then consider how best to incorporate each component of this framework into their overall API strategy:

- **Closed API Market; Limited API Use.** This stage uses APIs to help organizations improve internally. Improving APIs internally requires thinking about improving data quality and standards and decomposing legacy systems into pieces of functionality for ease of access. Thus, this work helps build data and service management skills and acts as a foundational piece for other API work (Wixom 2016). Due to their substantial legacy environments, most large companies tend to start at this point.
- **Open API Market; Limited API Use.** As companies gain experience and confidence with APIs, they could decide to become a modular producer of plug and play products or services. Providing access to a limited set of APIs enables external developers to add value to an organization's products and services. This stage helps a company enhance its customer experiences in a variety of ways and creates new channels, enhanced products,

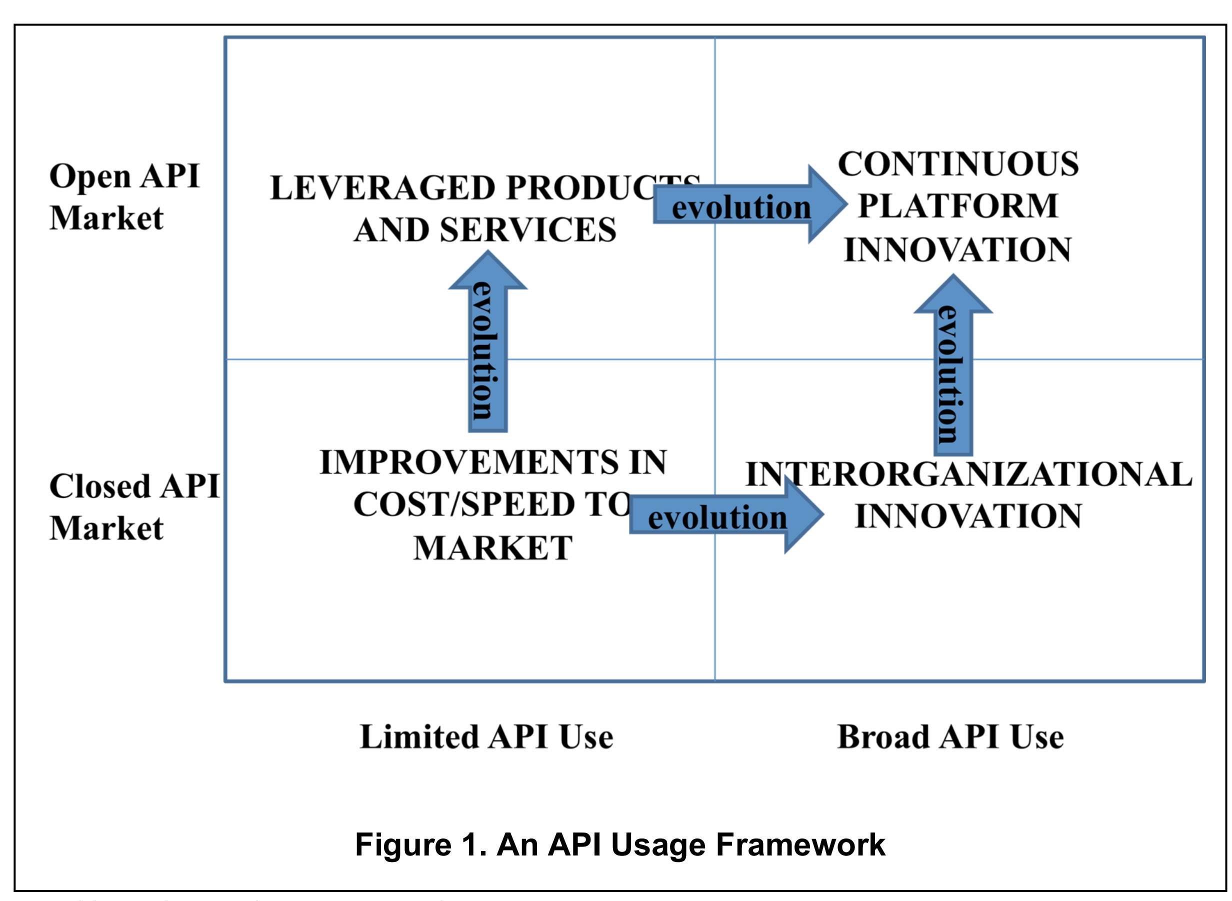


Figure 1. An API Usage Framework

and broader markets (Weill and Woerner 2015).

- **Closed API Market; Broad API Use.** This stage uses APIs to enable a limited number of partners to more broadly share data and functionality (Anuff 2016). Here, organizations attempt to offer real-time integration and build an limited ecosystem of trusted companies with complementary skills to add value and help them differentiate their products and services.

> Doing Business with APIs
>
> Of the top 50 most downloaded apps in Apple's app store, only a handful are fully functional with Siri… What happened? Many developers chose not to sign onto the [APIs]… to integrate the assistant… because Apple only let Siri be used in six categories… and that knocked just about everyone out. …. It was just too restrictive….
>
> Slow uptake [of APIs] from app developers risks further denting Siri's credibility, already bruised by the growth of Alexa [and] Google Assistant … Siri is struggling as other assistants get smarter…. Apple's rivals have gotten developers on board where Apple hasn't. Alexa… just passed 15,000 available "skills"… [while]… Apple lists less than 100 ways to use Siri.
> Adapted from Graham, 2017

- **Open API Market; Broad API Use.** This stage supports continuous innovation in an ecosystem (Isckia and Lescop 2015). It provides a branded platform and uses APIs to generate sales both through partners and third parties (Weill and Woerner 2015). It supports the continuous implementation of new configurations of products, market approaches, processes, technologies, competencies, and management systems. It also represents a new way of solving problems and discovering new business opportunities – leaving them to the external marketplace to solve. And it delivers new revenue streams through monetizing API use and new sources of value by delivering new groups of customers. Focus group members noted that this approach is more frequently used by "tech companies", such as Google or Netflix. "These are not representative of our business models," said a member.

This stage is the most challenging to implement and carries the most risk. However, it is also the most rewarding (Narain et al. 2015). It is very important to get the value proposition right and to remember that the ecosystem must provide sustainable incentives and rewards to API providers, developers, and users (Anuff 2016) (see box).

Regardless of the starting point, there are a number of common questions that companies will need to address when beginning to work with APIs, although these may have different answers depending on the approach(es) used. These include:

- Which of our platforms need APIs? How can we improve our understanding of the different approaches involved?
- How should we establish *options* for our future?
- If we are building external APIs, which internal APIs might they depend on?
- How can we motivate and manage both internal and external developers using our APIs?
- How can we attract and build partnerships to enhance our API strategy?
- How can we best integrate complementary products?
- What monetization strategy should we use: free; pay per use; tiered access; revenue sharing; subscription; or premium access?
- How will our architecture need to change with our API strategy?
- How should we assess the quality and value of an API?
- How will we manage an API's lifecycle over time?

Getting Started with APIs

It's clear that APIs will require a lot of change not only in business strategy, but also with the more practical aspects of how APIs are conceived, developed, managed, and governed. Managers therefore need some practical ways to think about how to get started using APIs. The focus group had the following advice for other business and IT leaders:

Identify potential sources of API value. First and foremost, organizations should seek to solve their customers' problems. This step transitions an organization from 'know your customer' to 'know how your customer needs to change', from making products easy to use to understanding customers' behavioral needs, from monitoring usage to monitoring value created, and from identifying unrecognized needs to converting unrecognized needs to 'must

haves' (Wixom 2016). Having a strong focus on the customer and creating customer-centric APIs are thus essential to the success of any API initiative (Columbus 2017). This means taking an outside-in perspective and focusing on customer needs, not on internal complexities or organizational siloes (Collins and Sisk 2015).

Sharing with APIs can meet strong institutional resistance. Ultimately, the focus group stated, it is the business that must decide whether this sharing will help or hurt, but leaders should ensure that their organizations take a longer-term view of their customers and that they understand what is and is not differentiating about their business.

Develop API governance. As a new element of an organization's business and technology strategy, APIs have mostly been adopted on an as-needed basis by whoever wishes. As a result, the focus group noted that there has been a proliferation of APIs without much coordination and oversight. API governance serves many functions. First, it ensures that new APIs are aligned with business strategy (Maliverno et al. 2017). Second, it establishes management, coordination, and control over API use by putting registration, cataloguing, and monitoring practices in place. Without these, there is a risk of sharing private or mission-critical data unwittingly (O'Neill 2016). Third, it makes common investments in the organization's platform to balance the tensions involved – between control and creativity, standardization and variety, and individual and collective needs. In short, it acts as the regulator of the organization's platform (Isckia and Lescop 2015).

A key debate in many focus group organizations is about API ownership. Members agreed that the business owns APIs but felt that recognition of the overarching issues and interdependencies involved was generally missing in business. They advised being pragmatic about how much control to exert – at least at these early stages. "The best thing to do at first is to monitor how APIs are developed and used and to spend governance dollars on remediation," said one member. "Plan big and start small." Initially, a governance group

should seek to identify the APIs currently in use, understand their usage, and what agreements are in place (O'Neill et al. 2017). From here, it can work to reduce redundancies, rationalize providers, optimize traffic and reduce costs (O'Neill 2016). By treating APIs as corporate assets that need management throughout their lifecycle, governance emphasizes their importance to the organization (Maliverno 2016).

Change how you think. "The most important change we in IT need to make is in our minds," said a manager. "Traditional systems development is like the soviet economic model – we will decide what you use; APIs on the other hand are more capitalistic because there's a market place." This mindset shift must extend to both strategists and developers. With APIs and microservices, software becomes the creative composition of pieces of functionality and data that can be pulled together quickly rather than a monolithic application (Narain et al. 2016).

Adopt new tools and capabilities. Although not every project will require the use of APIs, those aimed at delivering value or new capabilities, or for innovation and exploration will need to use new methods of development such as agile techniques and dev/ops, as well as new API-oriented standards and methods (Gilpin and Marshall 2017). Initially, at least, IT will need to become bimodal – operating in both new and traditional ways (Maliverno et al. 2017).

There are two approaches to building API capabilities: building them on a product-by-product basis; or building an internal API practice that creates APIs strategically (Gilpin and Marshall 2017). At present the companies in the group are focused on learning how to build and use APIs on a one-off basis but members recognized that more effort should be taken in the future to design and coordinate APIs, ensuring they expose the right data and functionality. "We have started with a vocabulary about APIs," said a manager, "and established standards and component names." This includes a common understanding of the data involved (e.g., a credit card number), and published definitions of what an API needs. Focus group managers suggested that organizations also need standards and protocols, methods about how to build

a good interface, documentation guidelines, and clarity around service level agreements in order to develop and use APIs effectively. And, if an organization is using external developers, it must have a means of registering and controlling their access to company APIs. "We need guidelines and documentation," said a manager, "or we're going to have a literal forest of APIs. Ideally, this should be done at the enterprise level, no matter where APIs are developed or consumed."

API tools are evolving rapidly and with third parties each having their own API interfaces, managing the API environment is still fraught with complexities and standards are difficult to establish and maintain (Longbottom 2015). IT leaders must therefore continue to monitor this marketplace and be prepared to evolve their tools and platforms as the API economy develops (Collins and Sisk 2015).

Build APIs first. "It is best practice to build the API before coding," said a member. The group agreed that APIs must be "rock solid" in design and connect to the common needs of the organization. Although the services underneath them may evolve, an API defines the nature of the company's connection with its consumers and this shouldn't be taken lightly. Involving a broad spectrum of stakeholders and designing APIs based on future ecosystem requirements, rather than on existing infrastructure and data models, is also perceived as best practice (Malinervo et al. 2017).

Ensure control. Secure access to APIs is the foundation of the API economy. Without authentication and authorization, organizations are vulnerable in many ways. "We need to prove to our regulators that no one can see or manipulate our data," said a manager. "We need visibility about who is accessing it, how often, and where." Connections must therefore be certified and control has to be part of every change. With external APIs in particular, organizations need to develop secure ways to communicate and share. "There's much more rigor around this when APIs are involved," said a manager.

Connect APIs to business metrics. One of the most appealing features of APIs, according to the focus group, is the ability to track their usage. "This helps us to know what works," said a manager. "It also makes it much easier to measure business value." Once usage patterns are clear, it is then possible to develop meaningful business measures of an API's value, such as number of users signing up for additional services, or capabilities accessed in new ways (O'Neill et al. 2017). "Linking APIs to business metrics helps us to focus on what APIs to develop and where to invest," said a member. "We should expect a business payback. If an API is not used, it's ineffective."

Expose and address risks. APIs create new levels and types of risk and business leaders are highly sensitive to these. "We must get these risks on our agendas. There are many and we are not adequately addressing them," said a manager. Some risks relate to bad data or poor decisions about data. Others relate to poor choices made by partners or about partners. And most important is reputational damage to core company products (Wixom 2016). Cyber-risks that can be exploited by hackers can be exposed when APIs are introduced (Collins and Sisk 2015). Finally, the effort involved of connecting external APIs to existing systems is often underestimated (O'Neill 2016).

While these are the risks of which companies are most aware, there are other less-obvious ones to address as well. The focus group noted that there is always a danger when an API is retired or a vendor goes out of business. If a company or its consumers depend on it, they may not be able to conduct their business. In some cases, these have led to lawsuits (Collins and Sisk 2015). API commercial agreements are often complex and poorly understood, again leading to potential legal liabilities. And API pricing is a risk too. Subscriptions for APIs may start small and grow fast, leaving unprepared companies with sticker shock (O'Neill 2016).

Conclusion

Companies are increasingly seeking to connect with external third parties – whether software-as-a-service providers, partners, or app developers. At present, they are being very cautious about doing this through APIs because of the significant risks involved. However, as with other types of change, the focus group predicted that the risks will be addressed over time and disruption to existing business models will accelerate. "While it's an internal marketplace right now for us," said a manager, "we'll be out there in five years." This paper has described how and why APIs are beginning to change IT and business and ultimately, our economy. It discussed the value APIs are expected to drive and presented a framework for developing API strategies. No one really knows how the API economy will shape up but "one thing we know is that we will look different ten years from now," the group concluded.

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